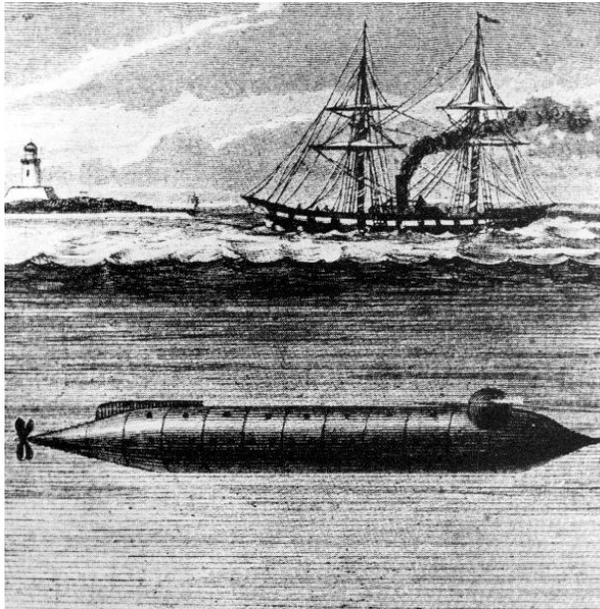


**USS ALLIGATOR**  
**“Submarine Battery”**

Assessment of Historic Documentation  
Regarding Its Loss



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## Project and Historic Synopsis

### Ship History

The USS *Alligator* was an experimental submarine designed and built by French diver and inventor Brutus de Villeroi in 1861 for the US Navy. Fabricated from riveted iron plates and originally powered by a system of oars, *Alligator* was constructed and tested at Philadelphia on the Delaware River. A diver was intended to lock out of the submarine and attach explosives to enemy targets. *Alligator* was towed to the James River, Virginia in June 1862 where it was found to be useless against its intended target of a Confederate bridge on the Appomattox River. After transfer to the Washington Navy Yard, the oars were removed and a hand-cranked screw propeller similar to the CSS *Hunley*'s was added. While being towed to aid in the attack on Charleston Harbor in April 1863, the *Alligator* sank somewhere off Cape Hatteras, North Carolina.

### Dimensions

Length: 47'

Beam: 4'-6'

Keel to top of hull: 6'

Displacement: 275 tons surface/ 350 tons submerged

### Loss of *Alligator*

The USS *Sumpter* was a wooden merchant screw steamer built in 1853 and chartered by the US Navy during the Civil War. She was considered to be in poor condition by the time she was commanded to tow the *Alligator* to Charleston in April 1863. *Sumpter* left Hampton Roads with *Alligator* in tow on April 1. *Alligator* was sealed with no crew on board. She soon encountered rising winds from the SW that grew to gale intensity by the time she reached Cape Hatteras late evening April 1. *Sumpter*'s last recorded coordinates with *Alligator* in tow was Lat 34.43, Lon 75.20 at noon April 2. The *Sumpter* continued to sail into the SW winds with fore and aft sails set and the bow plunging but took such a heavy pounding that the engines suffered partial failure and the forward hatches flooded. At 6PM, after breaking one of her two tow hawsers, the *Alligator* was cut free with the intention of the *Sumpter* returning to it once the storm had abated. By the time the storm had ended by 6PM April 3, *Sumpter* had been beaten north and was near Cape Henry where she had begun her voyage and was kept from returning to the site of the loss of the *Alligator* by a subsequent nor'easter that caused further damage. Two points are significant in any attempt to locate the *Alligator*. She was in a sealed and floating condition when she was lost. Since her intended use as a submarine required her to be leak-free, she may have drifted for some time before she sank unless she was severely damaged by the storm. Also, the *Sumpter*'s acting master's report to the Secretary of the

Navy suggests that during the storm, the master was concerned that they were in the Gulf Stream and were attempting to sail west to escape its northerly pull.

### Cultural Resource Significance

The USS *Alligator*'s paramount significance is that it was the U.S. Navy's first submarine. Although it is not the first submarine, its development paralleled the Confederate's series of experiments with submarines that culminated in the construction of the CSS *Hunley* which was lost after successfully sinking the USS *Housatonic* off Charleston, South Carolina on February 17, 1864. Assuming the *Alligator* were located and assuming its remains were in some recognizable context, it might be considered eligible for the National Register of Historic Places under several of the below listed criteria (the National Register serves as the Federal Government's threshold of national significance).

A. Association with events that have made a significant contribution to the broad patterns of US history

- The *Alligator* was the first tentative step towards the development of submarines as military warships and which are one of the foundations of the modern US Navy as well as many navies of the twentieth and twenty first centuries.

B. Association with the lives of persons significant in our past

- Not applicable

C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction

- The *Alligator* clearly satisfies this criteria as it was representative of a technological innovation that was being tested, also, by several entities at that time, including the Confederate Navy. An analogy might be found in the race to develop the first heavier than air powered aircraft.

D. Has yielded, or may be likely to yield, information important in prehistory or history

- Assuming the *Alligator* were to be found in a reasonably intact state, it would likely qualify on this criteria.

## Locating the USS *Alligator*

### Historical Research

In June 2002 NOAA National Marine Sanctuary Program Director Dan Basta directed me to conduct research to attempt to determine, as near as possible, the an area on the sea floor that might contain any extant remains of the USS *Alligator*. I was asked to coordinate with CAPT Woody Berzins who is the US Navy Office of Naval Research representative on this project. CAPT Berzins also designated CDR Richard Poole as a contact. After assessing all available secondary sources I identified as primary resources, letters of the acting masters of the USS *Sumpter* and the USS *Alligator* that reported the incident of the loss of the *Alligator* to the Secretary of the Navy. CDR Poole located the letters in the National Archives and transcribed them. After we extracted the pertinent information regarding the positions of the *Sumpter*, the winds, water temperatures (indicating the ship's location in the Gulf Stream), I consulted NOAA LT(jg) Jeremy Weirich, archaeologist, Office of Ocean Exploration, concerning navigation, plotting and survey design.

### Determining *Sumpter/Alligator* location (courtesy Jeremy Weirich)

Before we can wonder where the *Alligator* is, we need to first understand where the *Sumpter* was when she cut the last hawser that sent the *Alligator* adrift. To do this, we need to try to recreate the *Sumpter's* voyage through the Captain's letters, and take into account the weather and prevailing currents. We know the vessel's position at noon on April 2, and at 1800 that same day, the *Alligator* was set adrift. Between those six hours, here is what we know, or can assume, about the *Sumpter* and the sea state:

- She was a screw steamer. On a good day, with no current, she could probably do about 8.5 knots towing the *Alligator*.
- She was in the Gulf Stream.
- A very strong, southwesterly gale was gusting at the time.
- She was on a southerly and southwesterly course for most of the day, heading into the seas. At about 1540, she changed course to the northeast to run with the seas.
- Her engines were damaged at the time, and her storm canvas was barely keeping her ahead of the seas (after she had come about).
- The wind generated surface current for a Beaufort scale 9 is about 3 to 5 knots (as per a NOAA model used for oil spill assessment courtesy of the Office of Response and Restoration).

Using this data, a Mapinfo (version 6.5) plot was generated to determine the *Sumpter's* noon location on NOAA chart 11009 (Fig 1). From this fix, a circle with the radius of 51 nautical miles was drawn depicting the area the vessel could have traveled in six hours on a good day doing 8.5 knots. We can use this to assume the maximum area the *Sumpter* could have been when the hawser was cut.

Taking the weather conditions into consideration, the area was then reduced in size. It was assumed that the *Sumpter* was barely stemming the southwesterly wind and seas before she came about at 1540, but to maximize the area, a factor of 10 nm of headway was introduced. At 1540, she was keeping ahead of the seas, plus she was in the Gulf Stream, which prevails to the northeast in this area, so her progress in three hours was relatively slow, but probably geographically substantial. It was assumed that she covered a maximum of about 20 nm from 1540 to 1800.

The reason the dimensions are a trapezoid is because we need to take into consideration the error in the ship's position at noon and the drift the vessel experienced in six hours. They were not in sight of land, which meant that the position was derived from a celestial fix or a dead reckoning (DR) position. Since the storm obscured the sky, and few sailors would have bothered with a sextant in the pitching seas of a life or death storm, the noon fix was probably not celestial. Even so, a celestial position has a maximum accuracy of about 2 nm. If we assume it was a DR position, a violent storm, shifting wind and unruly helm would put that position off as well. Therefore, a "known" position at noon now becomes an assumed area.

In addition, we also have to consider that the wind was generally from the southwest, but it veered between south and west. The ship, in turn, was steering points between south and west, and then came about to the northeast. When one takes it consideration the relative angles of set on a ship steering various courses, we have to factor in some degree of drift (i.e., if she was steering northeast, she may have actually been drifting more towards the east). Thus, the trapezoid shape is used. As she was stemming the seas, her position changed little but there was some drift. As she came about, her speed increased, so did her drift, so lateral area of possibility spreads out accordingly.

### Where was the *USS Alligator*?

Just because we assume the *Sumpter* may have set the *Alligator* adrift in this area, does not necessarily mean she sank here. This is because the *Alligator* was not ready to be scuttled, in fact the crew of the *Sumpter* had every intention of going back to get her. The fact that she was staying afloat the entire time the *Sumpter* was struggling with the seas is a testament to her own seaworthiness.

We do know that after she was adrift, the wind continued from the southwest, but began to back towards the north. By 1800 the following day, a full gale was coming out of the northeast. From wind driven currents, one would assume that the *USS Alligator* may have made a "comma" shaped track going to the north, then east, the south and then to the southwest. However, she was also located in the Gulf Stream, which has a prevailing current to the east-northeast off Cape Hatteras. This was probably a much greater factor in her transport than the wind driven currents from the storm. Thus, if the *Alligator* did not immediately sink, it is highly unlikely that she is in the arbitrary trapezoidal area.

## Survey planning (Weirich)

From an operational stand point, and to put things into perspective, this is what we would be looking at if we were to survey the trapezoidal area with a class two or three ship using high-speed, high resolution side scan sonar or multibeam sonar systems. The US Navy and NOAA both have these capabilities.

### Multibeam survey:

- Line spacing is depth dependant; figure about three times the water depth
- 9000 m line spacing
- 11 lines including crosslines for QC
- 225.5 nm of lines
- Traveling at 10 knots (no need for the ship to go slow when acquiring data at this depth), it would take about 25 hours to accomplish, including turns. Assuming good weather. At 7 knots it would take about 34 hours.
- Positives: It is a quick, multi-disciplinary tool. Geologists are able to use the data, including the side scan backscatter imagery that is a by-product. It's also adequate for hydrographic charting standards. Plus the occasional CTD casts that are required to properly run the multibeam instrument would be useful to oceanographers.
- Negatives: It has poor resolution at this depth because the beams' "footprints" become so large. If the *Alligator* were down there, we could cover the entire area and miss it. Plus, the backscatter, side scan imagery is not adequate for target detection like the *Alligator*. Although we would acquire 100% coverage with the figures listed above, we would probably want to double our efforts and run an additional 100% set of lines orthogonal to the first set. This would increase our chances dramatically.

### Side scan sonar survey

- Line spacing is dependent on a constant range scale; at best for high speed, high-resolution instrument, figure 200 m (400 m swath).
- 360 m line spacing (for only 100%)
- 148 lines, including cross lines
- 3530.3 nm of lines
- Traveling at 7.5 knots, it would take 23 days including turns.
- Positives: The high-resolution imagery would allow for good target identification. The data would be useful to geologists.
- Negatives: As with most side scan sonar surveys, we would need to acquire an additional 100% coverage. This would involve creating a second set of lines that split the first. Thus, the time on site doubles to 47 days.

## **Next Steps**

### Recommendations

This concludes the historic assessment of the USS *Alligator*'s loss. CAPT Berzins and CDR Poole have indicated their intention to build a historic file containing all primary sources from the National Archives regarding the construction and operation history of the *Alligator*. They also will continue looking for documentation subsequent to the sinking of the *Alligator* that would indicate any court of inquiry that may have been held.

It is assumed that the USS *Alligator* was never declared abandoned and is still considered US Navy property. Under the National Historic Preservation Act of 1966 (NHPA), the Navy is obligated to protect its historic properties, including historic shipwrecks. The Naval Historical Center publication, "Sunken Naval Vessels and Naval Aircraft Wreck Sites" states that "The NHPA directs federal agencies to manage their cultural resource properties in a way that emphasizes preservation and minimizes the impact of undertakings that might adversely affect such properties."

It is suggested that the Naval Historical Center (NHC) be consulted as a partner in any undertaking regarding the USS *Alligator* that might impact the physical remains of the vessel. The NHC has vast historical resources and houses the office of the Navy's Underwater Archaeologist. It is also responsible for permitting any disturbance or archaeological investigations to historic naval vessels. They may be contacted at:

Naval Historical Center  
Office of the Underwater Archaeologist  
805 Kidder Breese Street SE  
Washington Navy Yard, DC 20374-5060  
202-433-2210; fax 202-433-2729  
<http://www.history.navy.mil>



